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Weed Control in Corn

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FS 554

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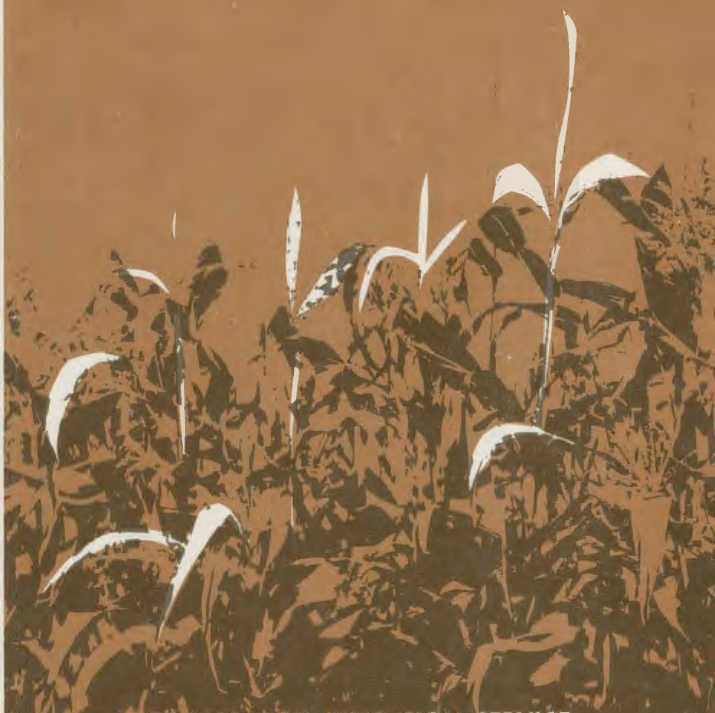

COOPERATIVE EXTENSION SERVICE
SOUTH DAKOTA STATE UNIVERSITY
U. S. DEPARTMENT OF AGRICULTURE

FS 554

Weed Control in Corn

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A good rotation, proper seedbed preparation, timely cultivation and herbicides are useful to control weeds in corn. Cultivation alone will not control most perennial weeds. Crop rotation and intensive cultivation are helpful, but herbicides are usually required. Controls for specific perennials are given in other fact sheets.

Cultivation for Weed Control

Proper tillage immediately before planting will kill emerged weeds and keep weeds from getting a head start on the crop. Several cultivation systems can be used to control weeds after the crop is planted.

Use disks in place of inside shovels for furrow planted corn, "throw out" on first cultivation, "throw in" on second when weeds emerge.

Special row cultivators designed for minimum till planting systems reduce the problems caused by plant residue on the soil surface. Chopping or shredding the previous year's corn stalks reduces cultivation problems. A rotary hoe or flextine harrow is useful to control emerging weeds when the crop is small.

Rotary Hoe. The rotary hoe should be used at a speed of 8 to 10 miles per hour. It is most effective if used before small weed seedlings develop green color. Results are best if the soil is crusted. Hoeing during the heat of the day reduces breakage if crop plants are large. Two hoeings can be done for about the same cost as the first row cultivation.

Flextine Harrow. The flextine harrow is operated at 2 miles per hour or less. It is most effective on weed seedlings less than ¼ inch high. Three harrowings can be done for about the same cost as the first row cultivation.

Herbicides for Weed Control

Herbicides can aid in controlling weeds in corn, but are not intended as replacements for sound management.

Mixtures of herbicides can capitalize on the good points of several herbicides while minimizing weak points. Herbicides used in mixtures may be purchased separately and tank-mixed in the sprayer or some may be purchased in one container as a commercial premix. Tank mixtures allow more flexibility in selecting the rate of each herbicide to be used. Mix only those herbicides that are labeled for use together.

The practice of applying and incorporating preplant herbicides with liquid fertilizer instead of water, is receiving increased interest. This saves one trip across the field, however, agronomists question how effectively plants utilize these shallow-incorporated applications of phosphorous and potash. Before using, mix a small amount of the fertilizer and herbicide together to determine if they are compatible. Do not mix fertilizer with herbicides unless they are labeled for use in this way.

Mixing and applying preemergence herbicides with insecticides or granular fertilizer has generally not been satisfactory. This usually results in improper placement of one of the products.

Granules vs Spray Formulations. Several herbicides are available in spray or granular formulations. Granules are preferred by some growers because they are easier to handle when band treating. However, granules usually cost slightly more per pound of active ingredient than spray formulations.

Broadcast vs Band Application. Band applications reduce the cost per acre for chemical. Band applications provide early season weed control and reduce yield losses that occur during the first 3 to 4 weeks after planting. Use a band that is 12 to 14 inches wide for surface-planted corn. Herbicides are usually applied in a 7-inch band instead of broadcast on furrow or lister-planted corn. Use special nozzles that apply the herbicide uniformly in the treated area for band spraying. Band applications should be made behind the press wheel of the planter. Preplanted-incorporated herbicides usually are not banded because suitable equipment is generally not available to incorporate the herbicide properly in the area ahead of the row.

With band application, at least 2 cultivations are required to control the weeds between the rows. One cultivation is usually required for broadcast treatments. Do not throw untreated soil into the treated band if no weeds are present during the first row cultivation. Always operate a rotary hoe or flextine harrow in the same direction as the rows if the crop has been treated.

For band application, determine the amount needed for the area actually treated. For example, if the broadcast rate of 3 lb/A of product is applied in 12-inch bands to 36-inch rows, only a third of the area is actually treated as the field is crossed, and only one-third of the 3 lb/A rate is needed. Therefore, 1 pound of product is all that is needed to band spray each acre. (See fact sheet "Weed Sprayer Calibration.")

Preplant Applied Herbicides. These herbicides are applied before planting and are usually incorporated with a disk, PTO-driven tiller or other suitable equipment. Some herbicides must be incorporated immediately after spraying to prevent loss of chemical due to volatilization or breakdown from sunlight. The rainfall requirement is usually less critical and the seasonal variation in performance is usually less with

preplant than with preemergence applied herbicides. Herbicides usually are not applied preplant-incorporated on furrow or lister-planted corn unless the furrow is very shallow.

Preemergence Applied Herbicides. These herbicides are applied after planting, but before the crop and weeds emerge. Weed control is usually better if tillage operations for seedbed preparation are performed immediately before planting and if the herbicide is applied immediately after planting. Emerged weeds are usually not controlled. Some herbicides will injure the crop if it is emerged at the time of application. Moisture is required within 1 to 2 weeks after application to move the chemical into the soil. Some herbicides are less soluble than others and require more moisture, however, ¾ to 1 inch of moisture is usually adequate. More moisture is required if the soil is dry than if it is moist. For best results, the soil should be free of large lumps and heavy amounts of plant residue. A shallow cultivation with a rotary hoe or flextine harrow is suggested if weeds emerge before adequate moisture is received. Preemergence herbicides are not effective if the area is disturbed by deep cultivation.

Post-emergence Applied Herbicides. These herbicides are applied after the crop and weeds have emerged. Spraying at the wrong time may result in crop injury or poor weed control. Post-emergence treatments which must be directed so only the weeds are sprayed require special equipment and usually a height differential between the crop and the weed.

Herbicide Recommendations

The information presented in this publication is based on field tests and observations in South Dakota. Herbicide uses must be approved by the Environmental Protection Agency (EPA) before they are recommended. The label directions often include additional rates and uses that have not been tested or that do not apply to general situations in South Dakota. The labeler will assume responsibility only for those uses stated on the label.

Safety First

Read and follow all label directions and precautions. Federal regulations and label directions are subject to change.

Recommended Herbicides

2,4-D

Chemical and formulation	Amount per acre broadcast Acid equivalent
2-4-D ester	¼ lb
2,4-D amine	½ lb

Use 2,4-D to control many emerged broadleaved annual and some perennial weeds. Spray over the top of corn until it is 8 to 10 inches tall. Use drop nozzles for taller corn. Use a high clearance sprayer with drop nozzles after the silks are brown for retreating perennial weeds. Corn is usually tolerant to ¼ pound of ester formulations and ½ pound acid equivalent of amine formulations per acre until 1 week before silking. Rates of ¾ to 1 pound acid equivalent per acre treated may be used for applications after the silks are brown.

Post-emergence applications of 2,4-D will kill many broadleaved annual weeds and weaken and prevent seed production on some broadleaved perennial weeds.

Table 1. Amount of 2,4-D Required to Control Numerous Weeds at Various Growth Stages

¼ lb/A	⅓ lb/A	½ lb/A
Kochia, 2-4 in.	Kochia, 4-8 in.	Kochia, over 8 in.
Ragweed, 2-4 in.	Ragweed, over 4 in.	
Pigweed, 2-4 in.	Pigweed, over 4 in.	
Mustard, 3-6 in.	Mustard, over 6 in.	
Lambsquarters, 4-6 in.	Lambsquarters, over 6 in.	
	Cocklebur, 2-6 in.	Cocklebur, over 6 in.
	Sunflower, 2-6 in.	Sunflower, over 6 in.
	Ladysthumb, 2-6 in.	Ladysthumb, over 6 in.
	Velvetleaf, 4-6 in.	Velvetleaf, over 6 in.
	Russian thistle, 2-4 in.	Russian thistle, 4-6 in.
	Wild buckwheat, 2 leaves	

The maximum rates to use are suggested above. Use only enough herbicide to control the weeds (Table 1). Larger, more mature weeds may not be controlled.

Use drop nozzles after corn is 8 to 10 inches tall. Determine the plant height by measuring from the ground to the top of the whorl. Do not spray from 1 week before silking until after the silks are brown.

Some brittleness may result for 7 to 10 days after spraying corn with 2,4-D. Strong wind or careless

cultivation during this period may cause stalk breakage. Brace roots are sometimes damaged or malformed, causing plants to bend or lodge. Sometimes the upper leaves remain tightly rolled (onion-leaf) causing delayed tassel emergence. Excessive breakage, lodging or root damage may result in a yield loss, but onion-leaf seldom does.

Several factors influence the degree of injury from 2,4-D. When corn is sprayed at the proper stage, environmental conditions usually affect the amount of injury more than the amount of herbicide used. Spraying 2,4-D during very cool, wet weather when plants are under stress or during very hot, humid weather increases the possibility of injury. Some corn hybrids are more susceptible than others.

Avoid drift to susceptible plants.

Treated corn may be harvested for grain or silage.

Noxious Weeds. Use ¾ to 1 pound acid equivalent of 2,4-D per acre to control broadleaved noxious weeds. Although there is some chance of injuring the corn, numerous applications at these rates have been made near the time of the second cultivation without causing damage. Apply a second treatment after the tassels turn brown using a high clearance sprayer equipped with drop nozzles.

For more details on noxious weed control, see the fact sheet that discusses the weed you have in question.

alachlor (Lasso)

Chemical and product formulation	Amount per acre broadcast: Active ingredient	Product
alachlor—4 lb/gal	2-2½ lb	2-2½ qt
alachlor—15% gran	3 lb	20 lb

Apply alachlor preemergence immediately after planting to control most annual grasses and some broadleaved annual weeds. Use 2 to 2½ pounds active ingredient per acre treated. Use the higher rate for most consistent weed control on soils with over 3% organic matter. The granular form is used at 3 pounds active ingredient per acre.

Alachlor gives excellent control of most common annual grasses, although sandbur control is inconsistent. It gives fair to good control of some broadleaved annual weeds, including pigweed. Control of lambsquarters, smartweed and wild mustard is less consistent and sunflower, velvetleaf and cocklebur are not controlled. Consider mixing other herbicides with alachlor or following with a post-emergence 2,4-D application if broadleaved weeds are a major part of the weed problem. Broadleaved weed control is usually better when the higher rates are used. Rates up to 3 pounds active ingredient per acre may be used on very heavy soils.

The most consistent results with alachlor have been obtained in tests in the higher rainfall areas in the eastern and southeastern part of the state. It is less soluble than propachlor (*Ramrod*) and requires slightly more rainfall to move it into the soil.

Alachlor may be applied preplant incorporated, however, weed control has not been satisfactory with this application method in South Dakota.

Corn appears to have good tolerance to alachlor. There is no carryover effect on crops planted the following year. The granular and emulsifiable concentrate formulations appear to be equally effective.

Alachlor may be slightly irritating to some individuals. Corn may be harvested for grain or silage. However, do not graze or harvest for forage within 12 weeks after application.

alachlor (Lasso) plus atrazine

alachlor (Lasso) plus cyanazine (Bladex)

Chemical and product formulation	Amount per acre broadcast: Active ingredient	Product
alachlor—4 lb/gal	1½-2 lb	1½-2 qt
+	+	+
atrazine—80% wp	1 lb	1¼ lb
atrazine—4 lb/gal	1 lb	1 qt
alachlor—4 lb/gal	2 lb	2 qt
+	+	+
cyanazine—80% wp	1.6 lb	2 lb

Apply a tank-mix of alachlor plus atrazine or cyanazine to control most common annual grasses and many broadleaved annual weeds. Use 2 pounds active ingredient of alachlor plus 1 pound active ingredient of atrazine or 1.6 pound active ingredient of cyanazine per acre treated on most soils. Use the lower rate of alachlor in the mixture with atrazine on light, sandy soils. The rate of cyanazine may be reduced on sandy soils.

Alachlor is effective on annual grasses. Atrazine or cyanazine improves the control of broadleaved weeds, including mustard, pigweed, smartweed and velvetleaf. Some cocklebur may not be controlled.

Weed control has been consistent in tests in eastern and southeastern parts of the state. Use the rates suggested above on most soils; however, rates up to 2½ pounds of alachlor and 1.6 pounds active ingredient of atrazine per acre may be used on very heavy, clay soils.

Corn appears to have good tolerance to these mixtures. There is no carryover with the cyanazine mixture. Soybeans planted the year after 1 pound per acre atrazine is used are seldom injured, but small grain planted the following year may be injured from carryover.

These combinations are a mixture of an emulsifiable concentrate and the wettable powder. Atrazine is also available in liquid flowable formulation. Use sufficient agitation to keep the wettable powder from settling out.

Corn may be harvested for grain or silage.

Refer to the section on "alachlor" for more information on performance and handling precautions.

atrazine (numerous tradenames)

Chemical and product formulation	Amount per acre broadcast	
	Active ingredient	Product
atrazine—80% wp	2-3 lb	2½-3¾ lb
atrazine—4 lb/gal	2-3 lb	2-3 qt
atrazine—80% wp	1-2 lb	1¼-2½ lb
+		+
crop oil		1 gal
atrazine—4 lb/gal	1-2 lb	1-2 qt
+		+
crop oil		1 gal

Atrazine controls many grassy and broadleaved annual weeds. Use atrazine in any of three different ways: (1) preplant and incorporate one-inch deep, (2) premergence, or (3) post-emergence with crop oil before weeds are 1½ inches tall.

Use 2½ pounds active ingredient per acre treated for preplant and preemergence treatments on most soils. On light, sandy soil, use 2 pounds and on very heavy soil, apply 3 pounds active ingredient per acre. Use 1 to 2 pounds active ingredient plus 1 gallon of crop oil per acre for post-emergence applications. The higher rate gives weed control for a longer time and is more consistent on heavy soils. The risk of carryover injury to crops planted the following year is greater with the higher rates.

Atrazine gives very good control of most annual weeds. Control of velvetleaf, cocklebur, and sunflower is fair to good. Late season grasses like crabgrass and fall panicum are tolerant. Sandbur control is inconsistent.

Preplant incorporated applications provide the most consistent weed control in South Dakota. Some years, early season weed control is slightly better with preemergence applications, but by mid-season, the preplant incorporated treatments are equal or better. Make preplant applications within 2 weeks before planting. The chemical may be incorporated during the final tillage operation before planting. Incorporate with a tandem disk set to cut to 2 inches deep. Do not incorporate the herbicide too deep.

Preemergence applications are somewhat inconsistent in South Dakota in seasons or areas with limited rainfall. Performance is usually satisfactory if ¾ to 1 inch of rainfall is received soon after planting.

Post-emergence applications of atrazine are more satisfactory if crop oil and water are used as a carrier. The crop oil increases the foliar uptake of the chemical and less chemical is required. The higher rates of atrazine suggested above give more consistent grassy weed control than the lower rates, but the lower rate usually gives good control of broadleaved annual weeds. Control is best if rainfall is received soon after application. Post-emergence applications should be made before weeds are more than 1½ inches tall. Control of larger annual grasses requires more herbicide.

Several kinds of crop oils and combinations of crop oil with surfactants are available. Each of these has not been evaluated, however, petroleum or vegetable base oils are generally superior to non-oil type surfactants. Oils should contain at least 1% emulsifier. Most concentrated oils, vegetable based oils, and combinations of oil with surfactant are used at lower rates than the 1 gallon per acre rate suggested for regular crop oils. Use the amount specified on the label of the product being used.

The liquid flowable formulation contains very finely divided particles of atrazine suspended in liquid. It is easier to handle than the wettable powder formulation. The amount of water carrier required is reduced from 10 gallons per acre for wettable powder to 5 gallons per acre for the liquid flowable formulation. However, the label suggests a minimum of 10 gallons per acre for post-emergence applications made with crop oil.

Small grains, flax and grass or legume underseeding should not be planted the year after atrazine is applied because of risk of injury from carryover. Using low rates with oil or the lower rates used in combination with other herbicides reduces but does not eliminate the risk of injury. Soybeans may be planted if rates below 2 pouns active ingredient per acre are used, however, some soybean injury has been reported in South Dakota when rates between 1 and 2 pounds were used the previous year.

Atrazine will provide very good quackgrass control when used at higher rates than those suggested. See the fact sheet on quackgrass control for complete information.

The liquid flowable and wettable powder formulations appear to be equally effective. Corn has good tolerance to atrazine. Some yellowing or leaf tip burn has been noted from post-emergence applications with crop oil, especially if the corn is under stress during cold, wet weather. Do not use 2,4-D, dicamba, or other hormone-type herbicides with atrazine plus crop oil mixtures because of risk of injury.

Treated fields may be harvested for grain or forage. Do not graze or feed forage from treated areas for 21 days after application.

butylate (Sutan+)

Chemical and product formulation	Amount per acre broadcast	
	Active ingredient	Product
butylate—6 lb/gal	3-4 lb	4-5⅓ pt

Incorporate butylate before planting to control most annual grasses, including sandbur and late season grasses. Use 3 to 4 pounds active ingredient per acre treated. Use the lower rate on light, sandy soils. Apply to a dry soil surface and incorporate immediately to a depth of 2 to 3 inches.

Butylate gives very good control of annual grasses, but most common broadleaved annual weeds are not

controlled satisfactorily. Consider mixing butylate with atrazine or use 2,4-D post-emergence if broadleaved weeds are a major part of the weed problem. Weed control has been consistent in much of the corn growing area.

Butylate must be incorporated thoroughly into the soil immediately after application to prevent loss of the chemical from evaporation. Spray and incorporate in one operation if possible. Incorporate with a disk set to cut 4 to 6 inches deep or a PTO-driven tiller set to cut 3 inches deep. Use tandem disking or disk twice at right angles with a single disk. A harrow or other leveling device behind the disk is helpful.

Corn appears to have excellent tolerance to butylate, as *Sutan*+ contains a safener to reduce the risk of crop injury. There is no carryover effect on crops planted the next year.

The emulsifiable concentrate is commonly used, however, butylate is also sold as a granule containing 10% active ingredient. Corn may be harvested for grain or silage. Do not use on seed production fields.

butylate (Sutan+) plus atrazine

Chemical and product formulation	Amount per acre broadcast Active ingredient	Product
butylate—6 lb/gal	3 lb	4 pt
+	+	+
atrazine—80% wp	1 lb	1¼ lb
atrazine—4 lb/gal	1 lb	1 qt

Incorporate a mixture of butylate plus atrazine before planting to control most annual grasses and many broadleaved annual weeds. Tank-mix 3 pounds of butylate plus 1 pound active ingredient of atrazine per acre treated. Apply to a dry soil surface and incorporate immediately to a depth of 2 to 3 inches. Tank-mix directions are on the *Sutan*+ label.

Butylate is effective on annual grasses. Atrazine improves the control of many broadleaved annual weeds. Some cocklebur and sunflower may not be controlled. This mixture gives good late season grass control and some sandbur control. Incorporate as for butylate alone.

The herbicides may be purchased separately and tank-mixed. The rates suggested above give satisfactory weed control; however, rates up to 4 pounds of butylate and 1.6 pounds active ingredient of atrazine per acre may be used.

Corn appears to have excellent tolerance to this mixture. Soybeans planted the following year are seldom injured, but small grains planted the following year may be injured from atrazine carryover.

Use sufficient agitation to prevent the wettable powder from settling out. Corn may be harvested for grain or silage. Do not use on seed production fields.

Refer to the section on "butylate" for performance, incorporation and application information.

dicamba (Banvel)

Chemical and product formulation	Amount per acre broadcast Acid equivalent	Product
dicamba—4 lb/gal	¼ lb	½ pt

Apply dicamba post-emergence before corn is 36 inches tall or until 15 days before tasseling to control broadleaved annual or perennial weeds. Use ¼ pound acid equivalent per acre treated. Use drop nozzles to get better coverage of weeds after the corn is tall enough to form a canopy over the weeds.

To reduce risk of droplet drift to soybeans and other susceptible crops, spray before soybeans in area are over 10 inches tall, use 20 gallons per acre of water and use no more than 20 pounds pressure. Do not spray when wind is blowing toward soybeans and don't spray when wind is over 5 mph or if expected high temperature is above 80-85°F.

Post-emergence applications of dicamba will provide equal or better control of some broadleaved perennial weeds than 2,4-D. It is especially effective on Canada thistle. Results on field bindweed have been satisfactory. Application of ¼ pound per acre acid equivalent provides satisfactory weed suppression for the season, but is not enough for eradication. Dicamba will also provide satisfactory control of emerged broadleaved annual weeds if they are small. Cocklebur and sunflower control is less consistent with lower rates.

There appears to be less risk of corn injury from dicamba than from 2,4-D, although some injury has occurred. There is more risk of injury when the crop is growing very rapidly and if corn is sprayed when large. Injury symptoms include brittleness and curved stalks. Stalks may break or lodge from high wind or careless cultivation during this period.

Dicamba is a water soluble liquid. Corn may be harvested for grain or silage. Do not harvest for dairy cattle before the milk stage.

cyanazine (Bladex)

Chemical and product formulation	Amount per acre broadcast Active ingredient	Product
cyanazine—80% wp	2½-3 lb	3-3¾ lb

Apply cyanazine preemergence immediately after planting to control most annual grasses and annual broadleaved weeds. Use 2½ to 3 pounds active ingredient per acre treated. Use the lower rate on low organic matter, sandy textured soils.

Cyanazine controls several broadleaved annual weeds, including mustard, smartweed, and velvetleaf. Satisfactory cocklebur control has been reported. Pigweed control has been unsatisfactory. Most common annual grasses are controlled.

The most consistent results with cyanazine have been in the higher rainfall areas of the state. Weed control with the granular form (*Bladex*–15% gran) has been less consistent than with spray formulation when rainfall after application is low or marginal.

Cyanazine may be applied at 2 pounds active ingredient per acre early post-emergence without crop oil before the corn reaches the 4-leaf stage. Control has been fair with weeds under 1 inch tall but not satisfactory on larger weeds.

Corn appears to have good tolerance to preemergence applications. There is no carryover effect on crops planted the following year. Use sufficient agitation to keep the wettable powder from settling out.

Corn may be harvested for grain or silage.

propachlor (Ramrod)

Chemical and product formulation	Amount per acre broadcast	
	Active ingredient	Product
propachlor—65% wp	4-5 lb	6.1-7¾ lb
propachlor—20% granule	4-5 lb	20-25 lb

Apply propachlor preemergence immediately after planting to control most annual grasses and some broadleaved annual weeds. Use 4 to 5 pounds active ingredient per acre treated. Use the lower rate on light soils or in low rainfall areas.

Propachlor gives excellent control of most annual grasses, however, sandbur control is inconsistent. Pigweed may be controlled satisfactorily, but control of mustard, lambsquarters and many other broadleaved annual weeds is usually inconsistent or unsatisfactory. The higher rate of propachlor may give slightly improved broadleaved weed control. Propachlor may be applied post-emergence before grassy weeds reach the 2-leaf stage, however, weed control is usually less satisfactory. Consider using mixtures of other herbicides with propachlor or following with a post-emergence application of 2,4-D if broadleaved weeds are a major part of the weed problem.

Propachlor gives consistent weed control in most corn growing areas of the state. It is more consistent than many other preemergence herbicides in the lower rainfall areas or in seasons when spring rainfall is limited. Propachlor is more soluble, therefore, slightly less rainfall is required to move the chemical into the soil. One-half inch is usually adequate unless the soil is very dry. Propachlor persists in the soil long enough to give satisfactory weed control for 8 to 10 weeks. Incorporate the herbicide as shallow as possible if the field must be harrowed or rotary hoed to control weeds that emerge before rainfall.

Corn has good tolerance to propachlor. There is no carryover effect on crops planted the following year.

The granular and wettable powder formulations appear to be equally effective. The granules are less irritating to handle. Use sufficient agitation to keep the wettable powder from settling out. Corn may be harvested for grain or silage.

propachlor (Ramrod) plus atrazine or (Ramrod/atrazine)

propachlor (Ramrod) plus linuron (Lorox)

Chemical and product formulation	Amount per acre broadcast	
	Active ingredient	Product
propachlor—65% wp	3 lb	4⅔ lb
+	+	+
atrazine—80% wp	1 lb	1¼ lb
atrazine—4 lb/gal	1 lb	1 qt
Ramrod/atrazine—wp		5-7 lb
(propachlor + atrazine)	2.4-3½+1-1½ lb	
propachlor—65% wp	3 lb	4⅔ lb
+	+	+
linuron—50%wp	1 lb	2 lb

Apply a mixture of propachlor plus atrazine or linuron preemergence to control most annual grasses and broadleaved annual weeds. Tank-mix 3 pounds of propachlor plus 1 pound of atrazine or 2 pounds active ingredient of linuron per acre treated.

Propachlor gives very good control of annual grasses. Atrazine or linuron improves the control of many broadleaved weeds, including mustard, lambsquarters, smartweed and velvetleaf. Sandbur, sunflowers and cocklebur may not be controlled. Weed control has been consistent in most corn growing areas of the state, although atrazine or linuron are less soluble than propachlor.

The herbicides can be purchased separately and tank mixed. A commercial premixed wettable powder containing 48% propachlor and 21% atrazine is available. The rates suggested above give satisfactory weed control; however, up to 4 pounds of propachlor and 1.6 pounds active ingredient of atrazine per acre may be used on very heavy soils. Granules (*AAtram*) containing 13.3% propachlor and 6.7% atrazine give less consistent weed control in areas or seasons when rainfall after application is low or marginal.

Corn appears to have good tolerance to these mixtures. There is no carryover with the linuron mixture. Soybeans planted the year following application of 1 pound per acre of atrazine are seldom injured, but small grains planted the following year may be injured from atrazine carryover.

Use sufficient agitation to keep the wettable powder from settling out. Corn may be harvested for grain or silage.

Refer to the section on "propachlor" for performance and application information and handling precautions.

Other Herbicides

ametryne (Evik)

Ametryne has not been tested adequately in South Dakota.

It may have potential as a post-directed rescue operation when grasses are too large to be controlled by other post-emergence applications. Corn leaves will be injured if the spray comes in contact with them. Ametryne is formulated as a wettable powder containing 80% active ingredient. Label registration may be obtained in the future.

atrazine plus dalapon (Dowpon) plus crop oil

Label directions for this combination have been withdrawn.

cyprazine (Outfox)

Cyprazine is applied early post-emergence. Applications of ¾ pound active ingredient (3 quarts) per acre have given results similar to low rates of atrazine plus crop oil. Apply before the weeds are over one inch tall.

Cyprazine is a triazine-type chemical formulated as 1 pound per gallon flowable liquid. Carryover is similar to atrazine. The above rate is the maximum amount labeled for use.

dicamba (Banvel) plus atrazine

This early post-emergence applied tank-mix has not been adequately tested in South Dakota.

Both herbicides are effective on broadleaved annual weeds and atrazine will control some annual grasses. This mixture is not to be used with crop oil. Post-emergence applications of atrazine are usually more effective when a crop oil is added. Therefore, it would appear the control of annual grasses may be less satisfactory than with applications of atrazine plus crop oil. The rates suggested on the *Banvel* label are ¼ pound of dicamba plus 1 to 1½ pounds active ingredient of atrazine per acre.

dicamba (Banvel) plus 2,4-D

This tank-mix has not been adequately tested in South Dakota. There may be greater risk of corn injury when the maximum rate of each herbicide is used in the mixture compared with each herbicide used alone.

It is applied post-emergence. Drop nozzles must be used when the corn is more than 8 inches tall. Do not apply after the corn is 36 inches tall or later than 15 days before tasseling. Some reports indicate better control of broadleaved perennials than with either herbicide used alone. The rates suggested on the *Banvel* label are ¼ to ½ pound of 2,4-D amine plus ⅛ to ¼ pound acid equivalent of dicamba per acre.

EPTC (Eptam) and safener (Protect)

EPTC plus safener (Eradicane)

EPTC controls several annual grasses and annual broadleaved weeds, including sandbur and wild oats. Incorporate immediately with a tandem disk set to cut 4 to 6 inches deep and harrow.

EPTC will injure corn if a safener is not used. *Protect* must be thoroughly mixed with the seed so each kernel is treated with the dry powder. *Eradicane* is a premix of EPTC with the safening agent. Both methods have been effective in preventing crop injury. The 3 pound active rate per acre appears to be satisfactory for controlling most annual weeds. However, the minimum rate labeled for *Eradicane* is 4 pounds active per acre.

Cost of Herbicides

The approximate cost (suggested price) for herbicides purchased in small quantities is given in Table 2. The cost per acre is reduced proportionately for band applications. The cost of application is usually $1.00 to $1.50 per acre. See your dealer or custom applicator for current chemical and application costs.

Table 2. Approximate Cost of Recommended Herbicides

Chemical	Rate/A*	Cost per acre broadcast	
		Spray	Granule
alachlor	2½-3	$8.35	$ 9.80
alachlor + atrazine	2+1	9.70	
atrazine	2½	7.50	
atrazine + oil	1½+1 gal	5.35	
butylate	4	6.80	
butylate + atrazine	3+1	8.10	
cyanazine	3	10.50	
dicamba	¼	1.90	
propachlor	5	10.50	12.25
propachlor + atrazine	3+1	9.30	
propachlor + linuron	3+1	12.12	14.75
2,4-D	¼-½	.40-.50	

*Active ingredient or acid equivalent. The rates used are "average" rates recommended in the fact sheet.

Herbicide Performance

The ratings in Table 3 are based on field observations and other data. The comparisons are recommended application rates under average and favorable conditions in South Dakota. With unfavorable conditions, weed control may be better than suggested for some treatments.

Table 3. Herbicide Performance on Major Weeds in Corn

	Sunflower	Velvetleaf	Cocklebur	Wild buckwheat	Smartweed	Ragweed	Mustard	Lambsquarters	Pigweed	Barnyardgrass	Foxtails (green & yellow)	Giant foxtail	Sandbur	Panicum	Crop tolerance
Preplant Incorporated															
AAtrex	1	1	1	1	1	1	1	1	1	2	2	2	3	4	E
Sutan+	5	3	5	5	4	4	4	4	3	1	1	1	1	1	E
Sutan+ + AAtrex	2	3	2	1	1	1	1	1	1	1	1	1	2	1	E
Preemergence															
AAtrex	1	2	2	1	1	1	1	1	1	2	2	3	3	4	E
Lasso	5	5	5	3	4	4	4	3	2	1	1	1	3	1	E
Ramrod	5	5	5	4	4	4	5	4	3	2	1	1	3	1	E
Bladex	3	3	2	1	1	2	1	1	4	3	2	3	3	1	E
Lasso + AAtrex	2	3	2	1	1	1	1	1	1	1	1	1	3	1	E
Lasso + Bladex	3	3	2	1	1	2	1	1	1	1	1	1	3	1	E
Ramrod + Lorox	3	3	2	1	1	1	1	1	2	2	1	1	3	1	G
Ramrod + AAtrex	2	3	2	1	1	1	1	1	1	2	1	1	3	1	E
Post-emergence															
AAtrex + oil	1	1	1	1	1	1	1	1	1	3	2	3	3	5	G
2,4-D	1	1	1	2	3	1	1	1	1	5	5	5	5	5	F
Banvel	2	2	2	1	1	1	2	1	1	5	5	5	5	5	F

Weed ratings: 1=excellent; 2=satisfactory; 3=marginal; 4= poor; 5=none.

Crop tolerance: E=Excellent; G=Good; F=Fair; P=Poor.

The use of tradenames does not imply endorsement of one product over another.

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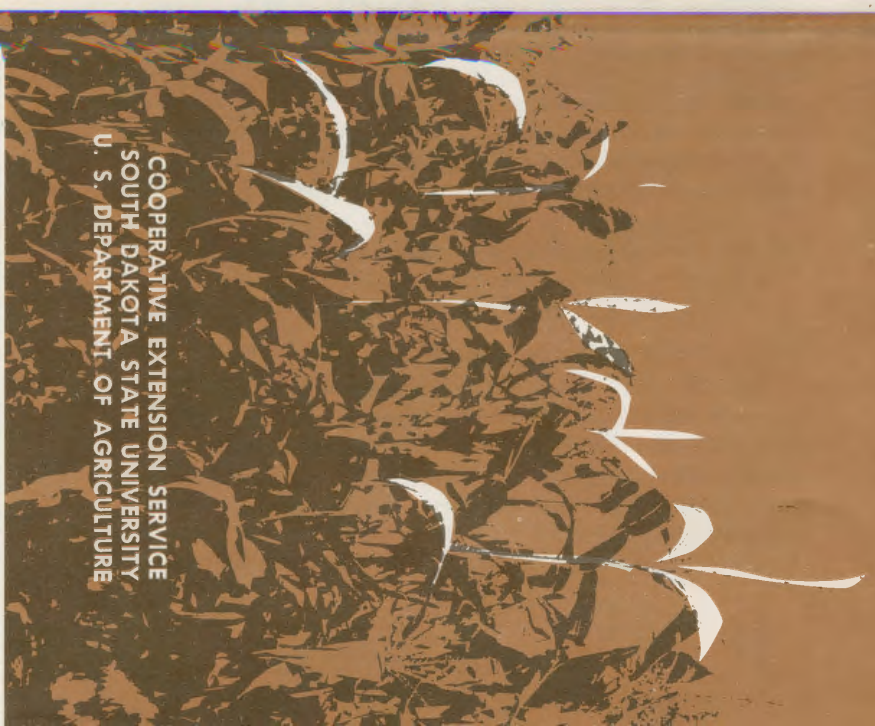

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